Mumps

Section 1: ABOUT THE DISEASE

A. Etiologic Agent

Mumps is caused by the mumps virus (genus *Paramyxovirus*, family *Paramyxoviridae*).

B. Clinical Description

Mumps is a systemic disease characterized by swelling of one or more salivary glands, usually the parotid glands. Parotitis tends to occur early and may first be noted as an earache or pain on palpitation at the angle of the jaw. Symptoms tend to decrease after one week and usually resolve after ten days. Prodromal symptoms are non-specific and may include myalgia, anorexia, malaise, headache, and low-grade fever. Up to 20% of mumps infections are asymptomatic, and an additional 40–50% may have only non-specific or primarily respiratory symptoms.

Symptomatic aseptic meningitis occurs in up to 10% of cases. Patients usually recover without complications, but may require hospitalization. Encephalitis occurs rarely, and permanent sequelae or death are uncommon. Infection in adulthood is likely to produce more severe disease, including mastitis, which occurs in up to 31% of females aged >15 years, and orchitis, which occurs in 50% of post-pubertal males. Other rare complications include arthritis, renal involvement, myocarditis, cerebellar ataxia, pancreatitis, and hearing impairment.

Mumps infection during the first trimester of pregnancy can increase the risk of spontaneous abortion, although no evidence exists that mumps infection in pregnancy causes congenital malformations. While death due to mumps is rare, more than half the fatalities occur in those ≥19 years of age.

Note: Swelling of the salivary glands can also be caused by infection due to parainfluenza virus types 1 and 3, influenza A, Coxsackie A, echovirus, Staphylococcus aureus, lymphocytic choriomeningitis virus, HIV, and noninfectious causes such as drugs (e.g., phenylbutozone, thiouracil, iodides), tumors, starch ingestion, metabolic disorders (diabetes, cirrhosis, and malnutrition), immunologic diseases, and obstruction of the salivary duct. However, other infectious causes of parotitis do not cause epidemic disease.

C. Vectors and Reservoirs

Humans are the only known host for mumps. While persons with asymptomatic or nonclassical infection can transmit the virus, no true carrier state is known to exist.

D. Modes of Transmission

Mumps is transmitted by respiratory droplets and by direct contact with nasopharyngeal secretions. While mumps can be transmitted by the airborne route, this is rare and should not be a parameter for determining exposure, especially in the school setting.

E. Incubation Period

The incubation period is usually 16–18 days, with a range of 12–25 days.

F. Period of Communicability or Infectious Period

Persons with mumps are usually considered infectious from three days before through nine days after onset of parotid swelling. (However, virus may be isolated from saliva up to seven days before the onset of swelling.) The initial day of swelling should be counted as day zero. Mumps is similar to influenza and rubella in infectiousness and is not as contagious as measles or chickenpox. Inapparent infections can be communicable.

G. Epidemiology

Mumps occurs worldwide. In the U.S., it is endemic year-round, peaking in winter and spring. Eighty percent of adults with or without a history of mumps have serologic evidence of immunity. The incidence of mumps in the U.S. has declined since an effective vaccine came into use in 1967. In 1986 and 1987 there was a relative resurgence of mumps, apparently due to the absence of comprehensive state immunization requirements, and in some instances, vaccine failure. The number of mumps cases reported in the U.S. has declined steadily since 1989, thanks in large part to the two-dose MMR vaccination policy. However, outbreaks in highly vaccinated populations still occur, probably due to vaccine failure.

Most adults born in the U.S. before 1957 have been infected and are probably immune to mumps. Mumps may be seen in unimmunized children or adolescents. Mumps may also occur in individuals from other countries where mumps vaccine wasn't routinely given and exposure to mumps is limited.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.

Section 2:
REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any of the following:

- A suspect or confirmed case of mumps, as diagnosed by a health care provider;
- Isolation of mumps virus from clinical specimen;
- Significant rise (four-fold or greater) in serum mumps immunoglobulin G (IgG) antibody titer between acute and convalescent sera by any standard serologic assay; or
- Positive serologic test for mumps immunoglobulin M (IgM) antibody.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

Serologic Testing

Mumps IgM Test

It is very important to obtain laboratory confirmation for cases and suspect cases of mumps. Due to cross reacting antibodies and other issues, sensitivity and specificity of commercially available IgM tests are problematic. The Centers for Disease Control and Prevention (CDC) and the MDPH do not recommend mumps IgM testing by commercial laboratories for confirmation or elimination of a diagnosis of mumps. Sera should be submitted to the MDPH State Laboratory Institute (SLI) for IgM testing. Mumps IgM detection by the enzyme-linked immunoassay (EIA) method performed at the SLI is very specific and has the additional advantage of low (or absent) cross reactivity with parainfluenza viruses. The specimen for mumps IgM testing should be drawn at any time between the day of onset of parotitis to a month after onset. However, specimens drawn $\geq$5 days after onset are less likely to yield negative results. The amount of serum required is 2 mL.

Mumps IgG Paired-Titer Testing

Paired serologic testing can be done at the SLI if IgM testing is not interpretable. Acute serum should be collected as soon as possible after onset of parotid swelling; convalescent serum should be collected about 14 days later. The amount of serum required is 2 mL.

Shipment of Sera

Sera should be sent with a cold pack and a completed SLI *Specimen Submission Form* (found at the end of this chapter and on the MDPH website at www.mass.gov/dph/bls/generalform.pdf) to:

Virus Serology Laboratory
MDPH State Laboratory Institute (SLI)
305 South Street
Jamaica Plain, MA 02130

Before sending sera, please call a MDPH immunization epidemiologist at (617) 983-6800 or (888) 658-2850.

Virus Isolation/Molecular Characterization of Mumps

In addition to serum, the collection of clinical specimens for mumps virus isolation on each person is extremely important and should be done on all individuals with suspected mumps. Mumps virus can be isolated from buccal swab, oropharyngeal or nasopharyngeal swab, urine, and cerebrospinal fluid (CSF). The two preferred specimens for viral isolation are the buccal swab and urine. Molecular characterization of isolated mumps virus is very useful in the confirmation of mumps in vaccinated individuals. It is also helpful in epidemiologic investigation; for example, to determine the source of infection and which cases and outbreaks are linked. In cases of mumps meningitis, the virus is readily isolated from CSF.

Parotid Gland/Buccal Swab

A buccal swab may provide the best viral sample for viral isolation. Collect buccal swab sample up to nine days after symptom onset (optimally within five days after onset). Massage the parotid gland area (the space between the cheek and teeth just below the ear) for about 30 seconds prior to collection of the buccal secretions. The parotid duct (Stenson's duct) drains in this space near the upper rear molars. The throat swab (oropharyngeal or nasopharyngeal

swab) can also be collected and placed in its own tube of viral transport medium (VTM). Agitate the swab(s) for at least 30 seconds in 2–3 mL of VTM or other sterile isotonic solution (phosphate buffered saline or cell culture medium).

Urine

Collect urine sample up to 15 days after symptom onset (optimally within first 5 days after onset). Collect 5–10 mL from clean catch urine and store in a screw top sterile container, preferably a 15 mL centrifuge tube.

CSF

Collect during three days of meningitis (if meningitis is present). Collect 1–2 mL in a sterile container.

All specimens should be collected as described above, maintained at 4°C, and delivered to the SLI on wet ice or ice pack within 24 hours of collection. If the specimen is collected over the weekend, it must be kept frozen at -70°C and submitted to the SLI on dry ice.

Specimens for mumps virus isolation may be submitted to the SLI Virus Isolation Laboratory. Contact a MDPH immunization epidemiologist, at (617) 983-6800 or (888) 658-2850, for further instructions on specimen collection and shipment.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify cases and susceptible exposed people rapidly in order to prevent further spread of the disease.
- To distinguish between failure to vaccinate and vaccine failure, and to address the problem.

B. Laboratory and Health Care Provider Reporting Requirements

Mumps is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of mumps, as defined by the reporting criteria in Section 2A.

Note: The MDPH requests that information about a case of mumps be reported as soon as possible to a MDPH immunization epidemiologist at the MDPH Division of Epidemiology and Immunization by calling (617) 983-6800 or (888) 658-2850.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of mumps infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-up Responsibilities

Reporting Requirements

MDPH regulations *(105 CMR 300.000)* stipulate that mumps is reportable to the LBOH and that each LBOH must report any case of mumps or suspect case of mumps, as defined by the reporting criteria in Section 2A. A MDPH

immunization epidemiologist, in collaboration with the LBOH, will complete the official MDPH *Mumps Case Report Form* (found at the end of this chapter). Using this form, cases will be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

Due to national surveillance and reporting requirements, the MDPH will take the lead on mumps case investigation (including filling out the official case report form) and disease control recommendations, in collaboration with the LBOH. The MDPH will keep the LBOH informed of all significant developments and will request the assistance of the LBOH as needed.

Initial Questions to Ask the Health Care Provider and Patient

In order to assess the likelihood that a suspect case is a true case prior to laboratory testing, the MDPH and/or other public health staff helping in the investigation should ask about:

1. Clinical presentation, including date of onset of symptoms, particularly parotitis, duration of parotitis, and complications (e.g., meningitis, deafness, encephalitis, mastitis, or orchitis);
2. Mumps immunization history;
3. Country of origin and length of residence in U.S.;
4. Recent history of travel (to where and dates);
5. Whether there were any recent out-of-town visitors (from where and dates);
6. Whether there was any recent contact with anyone with similar symptoms;
7. Risk factors for disease;
8. Possible transmission setting (e.g., childcare, school, health care setting); and
9. Laboratory information, including viral isolation and serologic test results.

Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4:
CONTROLLING FURTHER SPREAD

This section provides detailed control guidelines. The LBOH should familiarize themselves with the information. However, the MDPH will take the lead on implementing control measures, in collaboration with the LBOH.

A. Isolation and Quarantine Requirements *(150 CMR 300.200)*

Minimum Period of Isolation of Patient

Through nine days after onset of gland swelling (counting the initial day of gland swelling as day zero).

Minimum Period of Quarantine of Contacts

Students and staff born in or after 1957 who are not appropriately immunized or who do not have laboratory evidence of immunity will be excluded from work or classes from the 12th through the 26th day after their last exposure. When multiple cases occur, susceptibles need to be excluded through 26 days after the onset of the last case at the school or workplace.

Health care workers (or patients), regardless of year of birth, who are not appropriately immunized or do not have laboratory evidence of immunity will also be excluded (or isolated), as above. Additional control measures may be recommended by the MDPH.

B. Protection of Contacts of a Case

1. Implement control measures before serologic confirmation.
2. Inquire about contact with a known or suspect case or travel during the mumps exposure period (12–25 days prior to onset). Ask other questions outlined in Section 3C.
3. Identify all who have been exposed. To identify those exposed, think in terms of the "zones of exposure," and consider members of the following groups, if they were in contact with the case during his/her infectious period:
   a. Household members,
   b. School/daycare (students and staff),
   c. Staff and patients at medical facility where patient was seen,
   d. Individuals at workplace of case (especially daycare centers, schools, and medical settings),
   e. Religious/social groups,
   f. Sports teams and other extracurricular groups,
   g. Bus/carpool mates,
   h. Close friends, and
   i. Persons potentially exposed at social events, travel sites, etc.
4. Identify high-risk susceptibles who had contact with the case during the infectious period:
   a. Pregnant women should be referred to their obstetricians for screening and management. (In childcare or school settings, remember to determine whether any teachers, student teachers, staff, or students are pregnant.)
   b. Immunosuppressed individuals should be referred to their health care providers.
   c. Infants <12 months of age should be referred to their pediatricians.
5. Identify all other susceptibles. These are individuals without proof of immunity, including those with medical or religious exemptions to immunization. Proof of immunity is defined as:
   a. Birth in the U.S. before 1957, unless a health care worker or a college student;

b. Documentation of ≥1 dose of mumps-containing vaccine on or after the first birthday; or

c. Serologic proof of immunity.

Note: Persons born outside of the U.S. (without written proof of immunity) are considered susceptible, regardless of year of birth.

6. Immunize all susceptibles ≥12 months of age for whom MMR is not contraindicated. Please review *Attachment A: Measles, Mumps, Rubella (MMR) Vaccine Fact Sheet*, found at the end of this chapter, for more information. Because vaccine effectiveness is not 100%, a second dose of mumps-containing vaccine may be recommended during large or ongoing outbreaks for individuals who have received only one dose previously. Furthermore, birth before 1957 does not guarantee mumps immunity, and in outbreak settings, vaccination with a mumps-containing vaccine should be considered for those born before 1957 who may be exposed to mumps and who may be susceptible.

   Keep in mind the following:

   a. The combination MMR vaccine is the preferred formulation for all those ≥12 months of age. (MMR vaccine should never be given to infants.)

   b. Vaccinating an exposed individual who may be incubating mumps virus is not harmful (although mumps-containing vaccine, unlike measles vaccine, will not prevent infection or development of disease after infection). Exposed individuals should be vaccinated to protect against subsequent exposures.

   c. Immune globulin (IG) is of no value as post-exposure prophylaxis and is not recommended.

7. Exclude as follows:

   a. Case: Exclude through nine days after onset of parotitis (counting the day of swelling onset as day zero). The suspect case may return to normal activities on the tenth day.

   b. Contacts:

      i. Exclude susceptibles (including those with medical or religious exemptions) on days 12–26 after their last exposure, or if there are multiple cases, for 26 days after onset of parotitis in the last reported case in the outbreak setting. They may return on the 27th day.

      ii. Excluded susceptibles may be re-admitted immediately after vaccination. However, due to the relatively long incubation period of mumps, cases can be expected to occur for approximately three weeks following vaccination.

8. Conduct active surveillance for mumps for 2 incubation periods (50 days) after onset of the last case.

C. Managing Mumps in Health Care Settings

Proof of Immunity

Although birth in the U.S. before 1957 is generally considered to be acceptable evidence of immunity to mumps, many experts believe this criterion is not sufficiently reliable for health care settings. Therefore, all health care workers should have documentation of at least one dose of mumps-containing vaccine on or after the first birthday or serologic proof of immunity. Since two doses of MMR vaccine are more effective than one dose of mumps vaccine in preventing mumps, a second dose of MMR vaccine is now recommended for maximum protection of health care workers, regardless of age. An effective routine MMR vaccination program for health care workers (in addition to standard precautions) is the best approach to preventing nosocomial transmission.

Isolation of Patients

Patients should be placed on droplet precautions through nine days after onset of parotid swelling (counting the day of onset as day zero). They may be taken off precautions on the tenth day.

Exposed susceptible patients should be placed on droplet precautions from the 12th day after the earliest exposure through the 26th day after the last exposure. They may be taken off precautions on the 27th day.

Exclusion of Staff

- Personnel who become sick should be excluded from work through nine days post parotid swelling onset. They may return on the tenth day.
- Exposed susceptible personnel (including those with medical or religious exemptions) should be excluded from the 12th day after their first exposure through the 26th day after their last exposure. They may return on the 27th day.

Surveillance

Conduct active surveillance for mumps for 2 incubation periods (50 days) after onset of the last case.

D. Preventive Measures

Personal Preventive Measures/Education

Vaccination, including routine childhood vaccination, catch-up vaccination of adolescents, and targeted vaccination of high-risk adult groups, is the best preventive measure against mumps. Good personal hygiene (which consists of proper handwashing, disposal of used tissues, not sharing eating utensils, etc.) is also important.

A Mumps Public Health Fact Sheet for the general public can be obtained from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control."

ADDITIONAL INFORMATION

The following is the formal Centers for Disease Control and Prevention (CDC) surveillance case definition for mumps. It is provided for your information only and should not affect the investigation and reporting of a case that fulfills the criteria in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Case Definition for Mumps (As Defined by CSTE, 1999)

Clinical Case Definition

An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting ≥2 days and without other apparent cause.

Laboratory Criteria for Diagnosis

- Isolation of mumps virus from clinical specimen;
- Significant rise between acute- and convalescent-phase titers in serum mumps immunoglobulin G (IgG) antibody level by any standard serologic assay; or
- Positive serologic test for mumps immunoglobulin M (IgM) antibody.

Case Classification

Probable	A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically-linked to a confirmed or probable case.
Confirmed	A case that is laboratory-confirmed or that meets the clinical case definition and is epidemiologically-linked to a confirmed or probable case. A laboratory-confirmed case does not need to meet the clinical case definition.

Please refer to the *MMWR Measles, Mumps, and Rubella—Vaccine Use and Strategies for Elimination of Measles, Rubella, and Congenital Rubella Syndrome and Control of Mumps* publication (listed in the *References* section), the most current versions of MDPH's *Immunization Guidelines,* MDPH's model standing orders for measles, mumps and rubella vaccine, and *Massachusetts Immunization Program State-Supplied Vaccines and Patient Eligibility Criteria,* for recommended schedules, groups recommended, and groups eligible to receive state-supplied vaccine.

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ATTACHMENTS

Attachment A: Measles, Mumps, Rubella (MMR) Vaccine Fact Sheet

Attachment A

Measles, Mumps, Rubella (MMR) Vaccine Fact Sheet

The following should be considered when administering measles, mumps, rubella (MMR) vaccine or vaccines that contain one or more MMR component:

1. Allergy to Eggs

Hypersensitivity to eggs is not a contraindication per the American Academy of Pediatrics (AAP) and Advisory Committee on Immunization Practices (ACIP). Most allergic reactions following administration of MMR have been attributed to trace amounts of gelatin, neomycin, or other vaccine component (see below). Recent data have demonstrated the safety of MMR vaccine, even in those with a history of egg anaphylaxis. Skin testing is not predictive and not recommended in persons with a history of egg allergy.

Recommendations

Routinely vaccinate, as indicated, those with an egg allergy with any of these vaccines:

- Monovalent measles vaccine,
- Monovalent mumps vaccine,
- Monovalent rubella vaccine (rubella vaccine is not grown in chicken embryo cell culture), or
- MMR vaccine.

2. Allergic Reactions to Neomycin and Gelatin

Neomycin allergy most often manifests as a contact dermatitis. Non-anaphylactic reactions to either neomycin or gelatin are not contraindications to MMR vaccine.

Recommendations

Persons who have experienced true anaphylactic reactions to topically or systemically administered neomycin or to gelatin should receive MMR vaccine only in settings where such reactions can be managed, and after consultation with an allergist or immunologist.

3. MMR Vaccine and Autism, Associated Disorders, and Inflammatory Bowel Disease

The Institutes of Medicine (IOM) Immunization Safety Review Committee has concluded that the recent increases in autism and related disorders are not attributable to MMR vaccine. The AAP convened a panel of experts that also found that the available evidence does not support the hypothesis that MMR vaccine causes autism, associated disorders, or inflammatory bowel disease.

Recommendations

Follow existing recommendations for routine use of MMR vaccine at 12–15 months of age and a 2nd dose at 4–6 years of age.

4. Acute Arthritis/Arthralgia

Arthralgia (joint pain) and arthritis can occur in susceptible individuals post-vaccination with MMR. Joint pain has been reported in 0.5% of children. Up to 25% of post-pubertal females may develop arthralgia, and up to 10% may develop transient arthritis. If joint symptoms occur post vaccination, they generally begin 1–3 weeks post vaccination, are transient, and last only 1–21 days. Symptoms of acute arthritis/arthralgia are much less common post vaccination than with natural disease.

Recommendations

Vaccinate susceptible women of childbearing age because the potential risks of a susceptible woman having a child with congenital rubella syndrome (CRS) far outweigh risks of adverse events related to joint abnormalities.

5. Thrombocytopenia Purpura

MMR can rarely cause clinically apparent thrombocytopenia within 2 months of vaccinations, with temporal clustering 2–3 weeks after vaccination. Reported cases have been transient and benign in outcome. The estimated number of cases is two per one million doses distributed in the U.S. However, based on these case reports, the risk of vaccine-associated thrombocytopenia may be higher for those who have had a previous episode of thrombocytopenia, especially if it occurred in temporal association with earlier MMR vaccination.

Recommendations

If an individual has a prior history of thrombocytopenia:

- Check for serologic immunity (if immune, vaccination is NOT indicated); and
- Assess risk/benefit of vaccination.

In most cases, the benefits of vaccination will justify giving the vaccine.

6. Altered Immune Status

Enhanced replication of vaccine viruses may occur in persons who have immune deficiency disorders and are immunocompromised. For some of these conditions, all affected persons are severely immunocompromised. The degree to which the immune system is compromised depends on the severity of the condition, which in turn depends on the disease or treatment stage. The patient's health care provider must assume responsibility for determining whether the patient is severely immunocompromised based on clinical and laboratory assessment.

Recommendations

- Do not administer MMR vaccine to patients who are severely immunocompromised for any reason.
- Administer MMR vaccine to healthy susceptible contacts of severely immunocompromised persons.

7. MMR Vaccine for HIV-Infected Individuals

Because measles can be severe and often fatal in patients with HIV infection, MMR vaccine is recommended for people with asymptomatic HIV infection who are not severely immunocompromised. Severely immunocompromised HIV-infected patients, as defined by low CD4+ T-lymphocyte counts (considering age), should not receive measles virus-containing vaccine because vaccine-related pneumonia has been reported.

Recommendations

- Routine pre-vaccination HIV testing is NOT recommended.
- Administer MMR vaccine for routine immunization of individuals with asymptomatic HIV infection who do not have evidence of severe immunosuppression.
- Consider MMR vaccine for all symptomatic HIV-infected persons who do not have evidence of severe immunosuppression, as defined in the table below.

Measles-containing vaccines are contraindicated in those with the following:

Age Group	Total CD4+ Count	or	CD4+ as a % of Total Lymphocytes
<12 months	<750/mcL	or	<15%
1–5 years	<500/mcL	or	<15%
6–12 years	<200/mcL	or	<15%
≥13 years	<200/mcL	or	<14%

Source: CDC. Measles, Mumps and Rubella—Vaccine Use and Strategies for Elimination of Measles, Rubella, and Congenital Rubella Syndrome, and Control of Mumps: Recommendations of the ACIP. *MMWR*. 1998; 47(RR-8): 21.

- Do not administer MMR or other measles-containing vaccines to severely immunocompromised HIV-infected individuals (as defined by low CD4+ counts or low percent of CD4+ circulating lymphocytes—see above table).
- Since the immunologic response to vaccines is often poor in HIV-infected patients, give the 1st dose of MMR as early as possible after 12 months of age. This will increase the chance of an adequate immune response, before further deterioration of the immune system can occur.
- Give the second dose of MMR four weeks after the first. This will increase the likelihood of seroconversion.
- During outbreak situations only, consider giving the 1st dose of monovalent measles vaccine (or MMR, if monovalent measles vaccine is not available) at 6–11 months of age to those infants who are not severely immunocompromised. Remember, these children must be revaccinated with 2 doses of MMR beginning at 12 months of age. If possible, avoid giving mumps and rubella at <12 months of age.
- Administer MMR vaccine to healthy contacts of severely immunocompromised persons.

8. Live Virus Vaccines and Immunosuppressive Therapy

Recommendations

- After chemotherapy and other immunosuppressive therapy (except steroids—see table on next page), defer MMR vaccine for ≥3 months.
- For patients on steroids, defer live virus vaccines as outlined in the table on the next page.

Guidelines for Administration of Live Virus Vaccines and Steroid Therapy *

Steroid Therapy	Recommendations for Deferral
High dose systemic steroids daily or on alternate days for ≥14 days (≥2 mg/kg QD or ≥20 mg QD of prednisone)	Defer live virus vaccines for ≥1 month after treatment has stopped.
High dose systemic steroids daily or on alternate days for <14 days (≥2 mg/kg QD or ≥20 mg QD prednisone)	Can give live virus vaccines immediately after treatment is discontinued. However, some experts recommend deferring until two weeks after treatment has stopped, if possible.
Low or moderate doses of systemic steroids given daily or on alternate days (<2 mg/kg QD or <20 mg QD of prednisone); or physiologic maintenance doses of steroid (replacement therapy)	Can give live virus vaccines on treatment.
Topical, aerosol or local injections of steroids (e.g., skin, aerosol, eyes, intra-articular, bursal, tendon injections)	Can give live virus vaccines on treatment. However, if this therapy is prolonged and there is any clinical or laboratory evidence of immunosuppression, defer for ≥1 month after treatment has stopped.
Individuals with a disease which in itself is considered to suppress the immune response and who are receiving systemic or locally acting steroids	Should not give live virus vaccines, except in special circumstances.

Adapted from: American Academy of Pediatrics. [Immunization in Special Clinical Circumstances.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition*. 2003: 74–75.

Steroid therapy is not a contraindication for administration of killed vaccines.

9. MMR Vaccine and Pregnant Women

MMR vaccine is contraindicated in pregnant women due to the theoretical risk to the fetus. To date, there are no data demonstrating any ill effects on developing fetuses. Current data, estimated risk, and recommendations are outlined below.

Rubella

There is no evidence that rubella vaccine causes CRS. However, pregnant women should not be immunized due to the theoretical risk to the fetus, estimated to be potentially, on a statistical basis, 0–1.6%, based on data accumulated by the CDC on 226 susceptible women who received the current RA27/3 vaccine strain during the first trimester. Only 2% of the babies had asymptomatic infection but none had congenital defects. This risk is substantially less than the ≥20% risk for CRS associated with maternal infection in the first trimester of pregnancy. In view of these observations, receipt of rubella vaccine in pregnancy is not an indication for termination of pregnancy.

Mumps

There is no evidence that mumps vaccine will cause mumps infection in an unborn fetus. Live mumps vaccine can infect the placenta, but the virus has not been isolated from fetal tissue.

Measles

There is no evidence that measles vaccine will cause measles infection in an unborn fetus.

Recommendations

- Screening: Ask women of childbearing age if they are pregnant. Routine pre-vaccination pregnancy testing is NOT recommended. The American College of Obstetricians and Gynecologists (ACOG), the ACIP, and the AAP all state that it is sufficient to screen by asking a woman if she is pregnant.
- Patient Advice: Inform women of the theoretical risk to the fetus if they are pregnant or plan to become pregnant within four weeks following vaccination. In view of this theoretical risk, advise them not to become pregnant for four weeks following MMR vaccine.
- Vaccination: Do not vaccinate women who are pregnant.
- Documentation: Date of last menstrual period (LMP) and the advice given to the patient may be documented in the woman's chart.

10. MMR and TB Testing

Measles vaccination may temporarily suppress tuberculin skin test reactivity.

Recommendation

If TB testing cannot be done the day of MMR vaccination, postpone the test for 4–6 weeks.

11. Invalid Doses

Consider doses of measles, mumps, or rubella vaccines invalid in the following situations:

- Received before first birthday.
- Received after recent receipt of IG (please refer to *Attachment D: Use of Immune Globulin (IG)* of measles chapter).
- Killed measles vaccine.
- Killed measles vaccine followed by live vaccine within three months (both doses are invalid).
- Measles vaccine of unknown type received prior to 1963–1967.
- Simultaneous receipt of IG and either a further attenuated measles vaccine (i.e., containing Schwartz or Moraten strains) or measles vaccine of unknown type.
- Killed mumps vaccine.
- Mumps vaccine of unknown type received prior to 1979.
- Live rubella vaccine accompanied by IG.

Revaccination with MMR is recommended for eligible individuals such that at least two valid doses of measles-containing vaccine, one of mumps, and one of rubella are documented.

Updated 9/2005

FORMS & WORKSHEETS

Mumps

Mumps

LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to mumps case investigation activities.

LBOH staff should follow these steps when mumps is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

Note: Due to national surveillance and reporting requirements, the MDPH will usually take the lead on mumps case investigation (including filling out the official case report form) and disease control recommendations, in collaboration with the LBOH. MDPH epidemiologists will keep the LBOH informed of all significant developments and will request the assistance of the LBOH, as needed.

Reporting

- ❑ Immediately notify the MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, to report any confirmed or suspect case(s) of mumps.

Case Investigation

- ❑ Work with MDPH to ensure that appropriate clinical specimens are collected and submitted to the MDPH State Laboratory Institute (SLI) for confirmation.
- ❑ Work with MDPH to obtain the information necessary for completion of the case report form, including source of exposure, clinical information, vaccination history, laboratory results, and source of infection. (The MDPH will complete the form and submit it to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services [ISIS]).

Prevention and Control

- ❑ Work with MDPH to institute isolation and quarantine requirements *(105 CMR 300.200)*, as they apply to a particular case.
- ❑ Identify high-risk and susceptible individuals, including those with medical or religious exemptions.
- ❑ Vaccinate susceptible individuals with mumps-containing vaccine (if not contraindicated). MMR vaccine is preferred.
- ❑ Conduct surveillance for two incubation periods.

Managing Mumps in Schools and Other Institutions

In addition to the prevention and control measures described above:

- ❑ Implement surveillance for new cases.
- ❑ Notify and educate staff, students, and/or patients.
- ❑ Test and exclude symptomatic individuals.
- ❑ Isolate remaining susceptible contacts. (But in most non-health care settings, susceptibles may be re-admitted if they receive post-exposure vaccination.)

Managing Mumps in Health Care Settings, Schools, and Other Institutions

In addition to the prevention and control measures described above:

- ❑ Notify infection control or employee health of confirmed or suspect case(s) in institution.
- ❑ Ensure all health care personnel have proof of immunity appropriate for health care setting.
- ❑ In health care settings, susceptibles who get vaccinated after exposure are not allowed to return until the end of the exclusion period.